

Location based Solar Tracking Device

Group # SD1208

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Client: John Ihle

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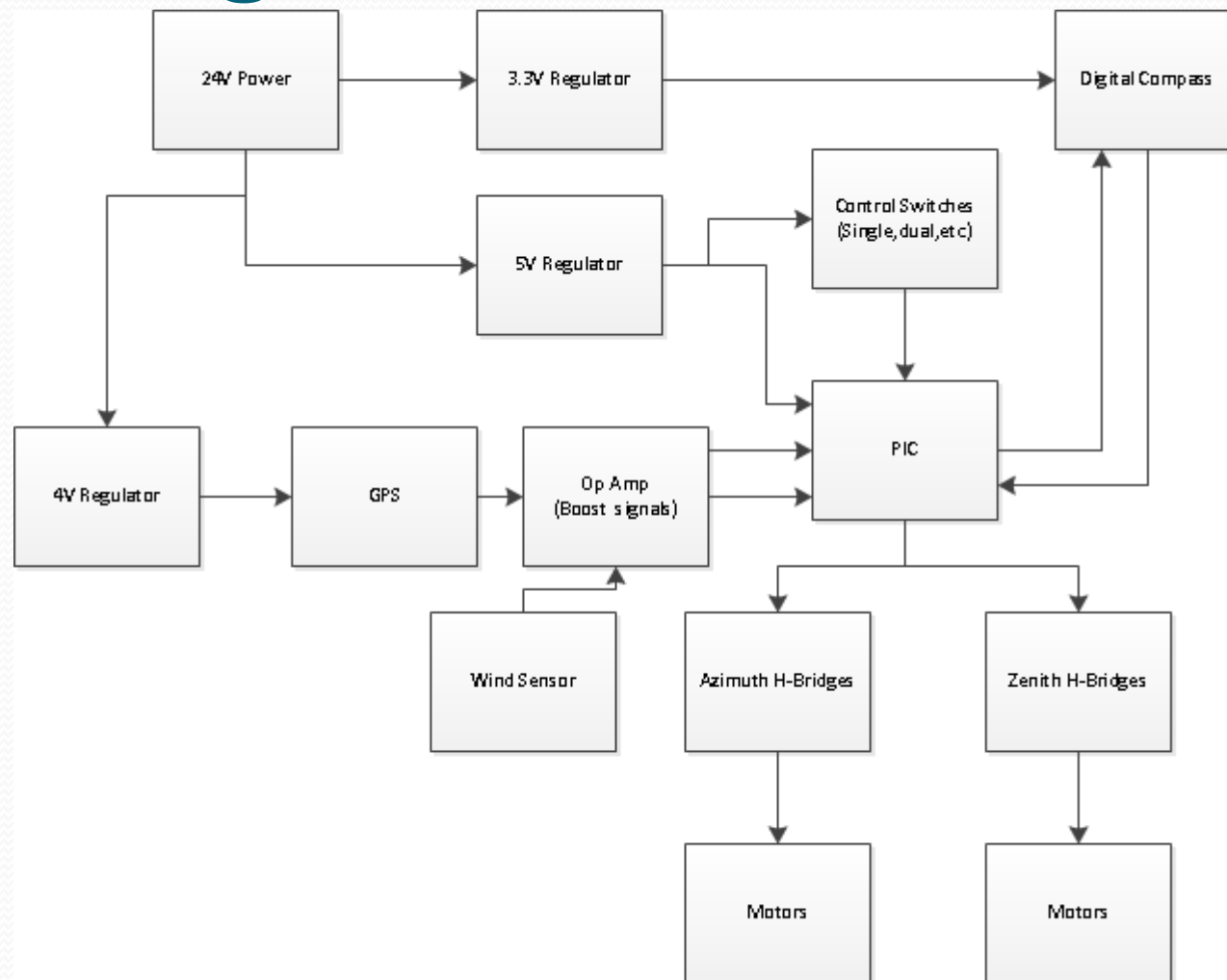
Introduction

John Ihle is our locally based client who wants a location based solar tracker. This involves designing and developing a controller that can be retrofitted to a dual-axis solar photovoltaic tracker system.

Client Requirements

- Currently the system will have to be compatible with both single and dual axis panels
- Current Power that has to be compatible with is a 24V system
- The Panels Have the capability to go 85 degrees to flat and no limit on the horizontal axis rotation
- Automatic and manual modes desired
- The ability to switch between single and dual axis mode also desired
- High grade equipment is desired to withstand extreme temperature conditions

Block Diagram



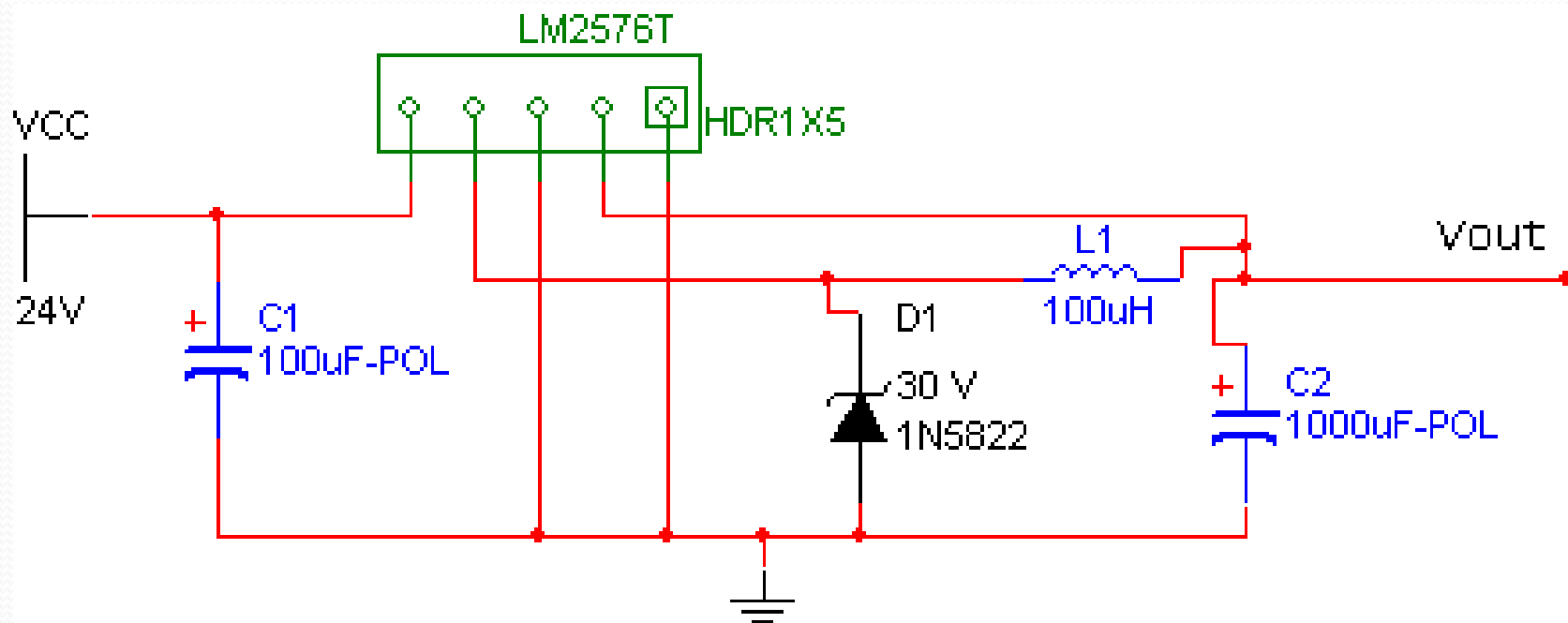


5V Regulator

- LM2576/LM2576HV Series - SIMPLE SWITCHER® 3A Step-Down Voltage Regulator
- 24V to 5V LM2576T-5.0-ND
- Advantages:
 - The regulator guarantees a 3A output current
 - Wide input range to compensate for power fluctuations
 - High efficiency
 - Thermal shutdown protection
 - Fixed frequency internal oscillator
 - High Temp Thresholds
- Disadvantages:
 - Output Voltage Ranges from 4.8-5.2V

We used this part to bring our 24V power supply down to 5V useable power supply for our components.

5V Schematic

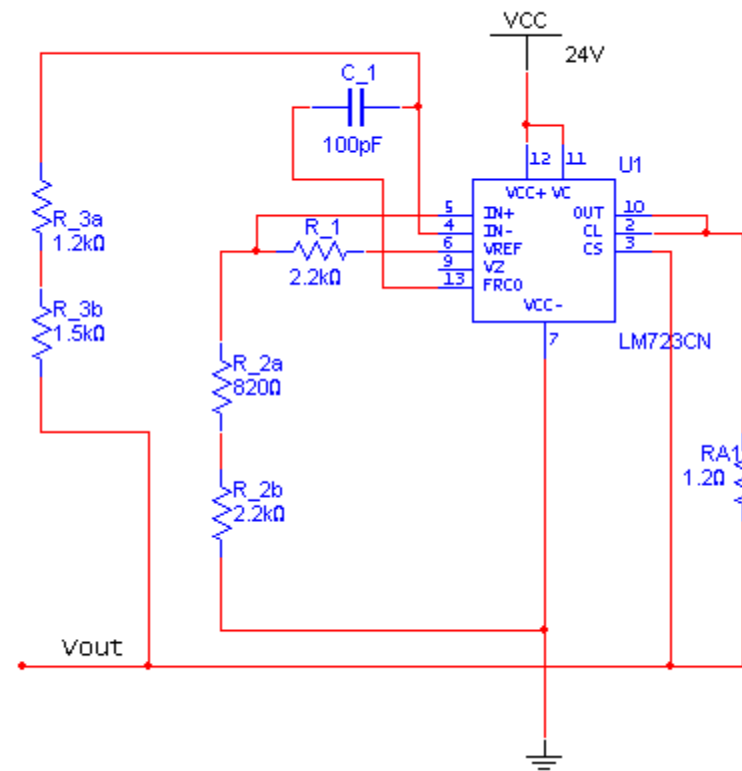
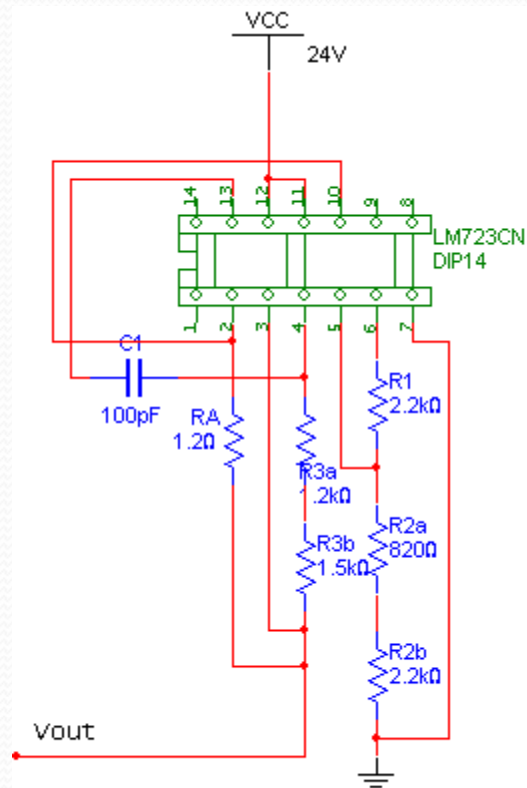




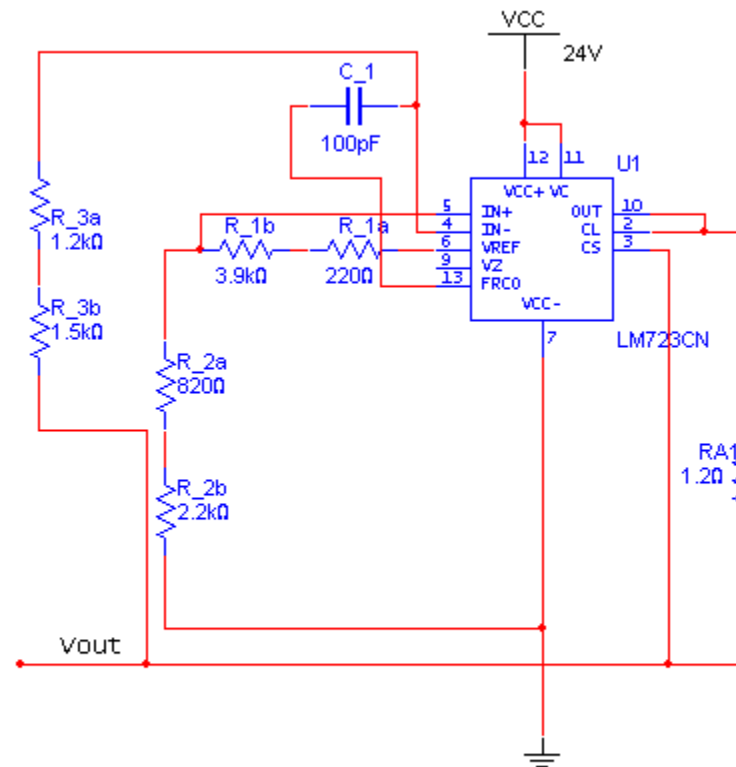
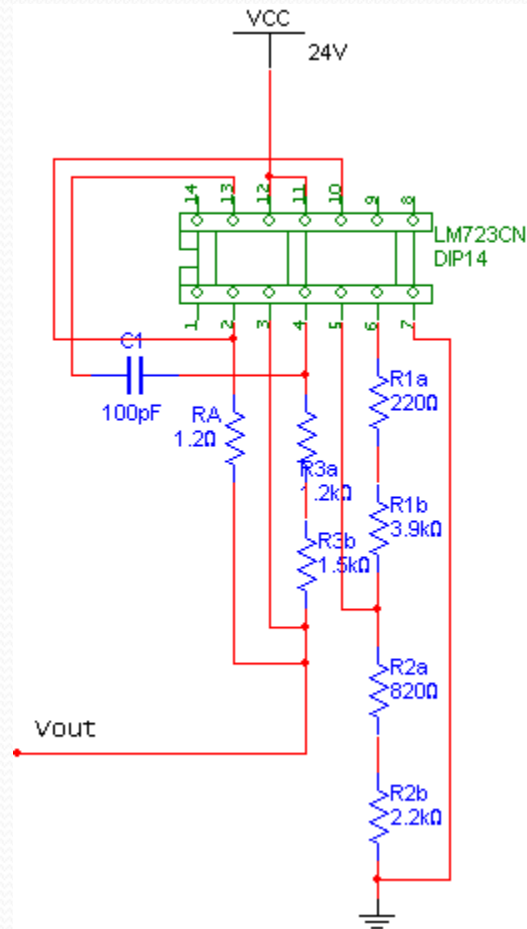
4V and 3V Regulators

- LM723
- -40 to 125C
- 150mA output
- Adjustable voltage
- Precision voltage
 - GPS needs this to be accurate
- Used with digital compass because we were already using one for GPS

4V Schematic



3V Schematic





GPS Sensor

- **RXM-GPS-SR**
- Low power consumption (46mW)
- High sensitivity (159dBm)
- No programming necessary
- Includes Date and Time

Figure 4 shows a typical application for the module.

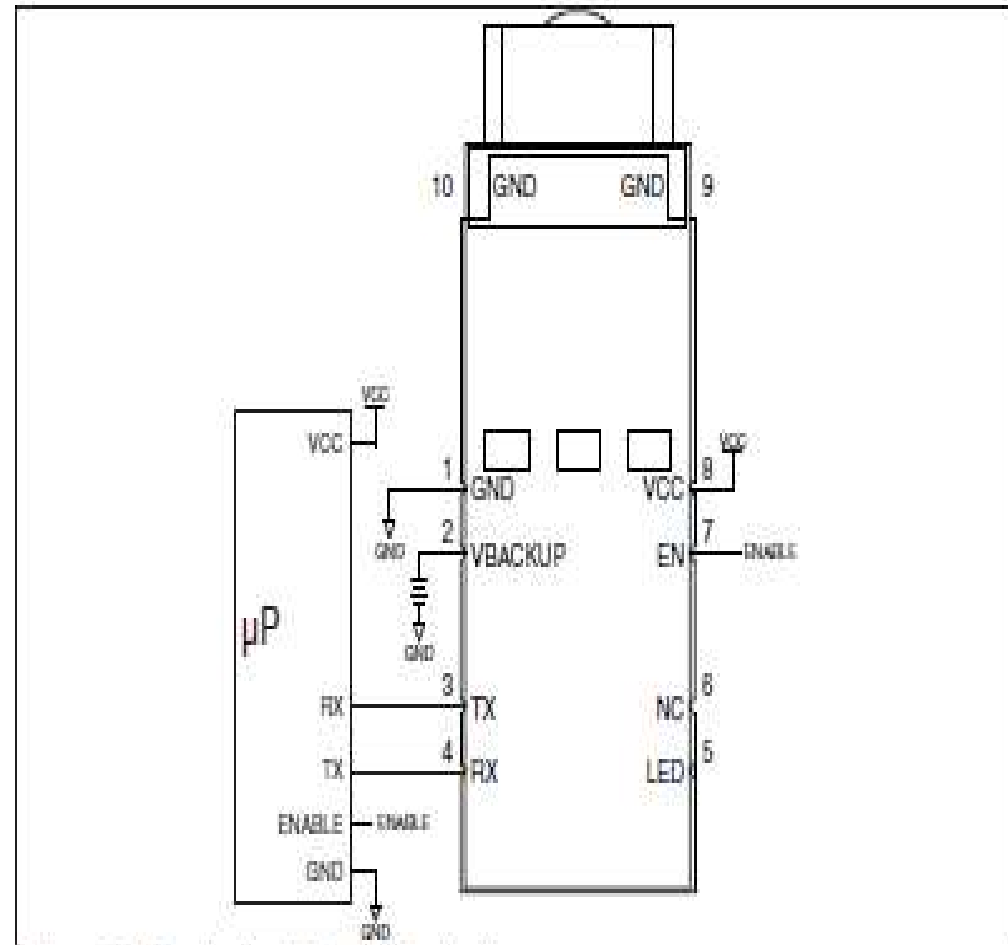
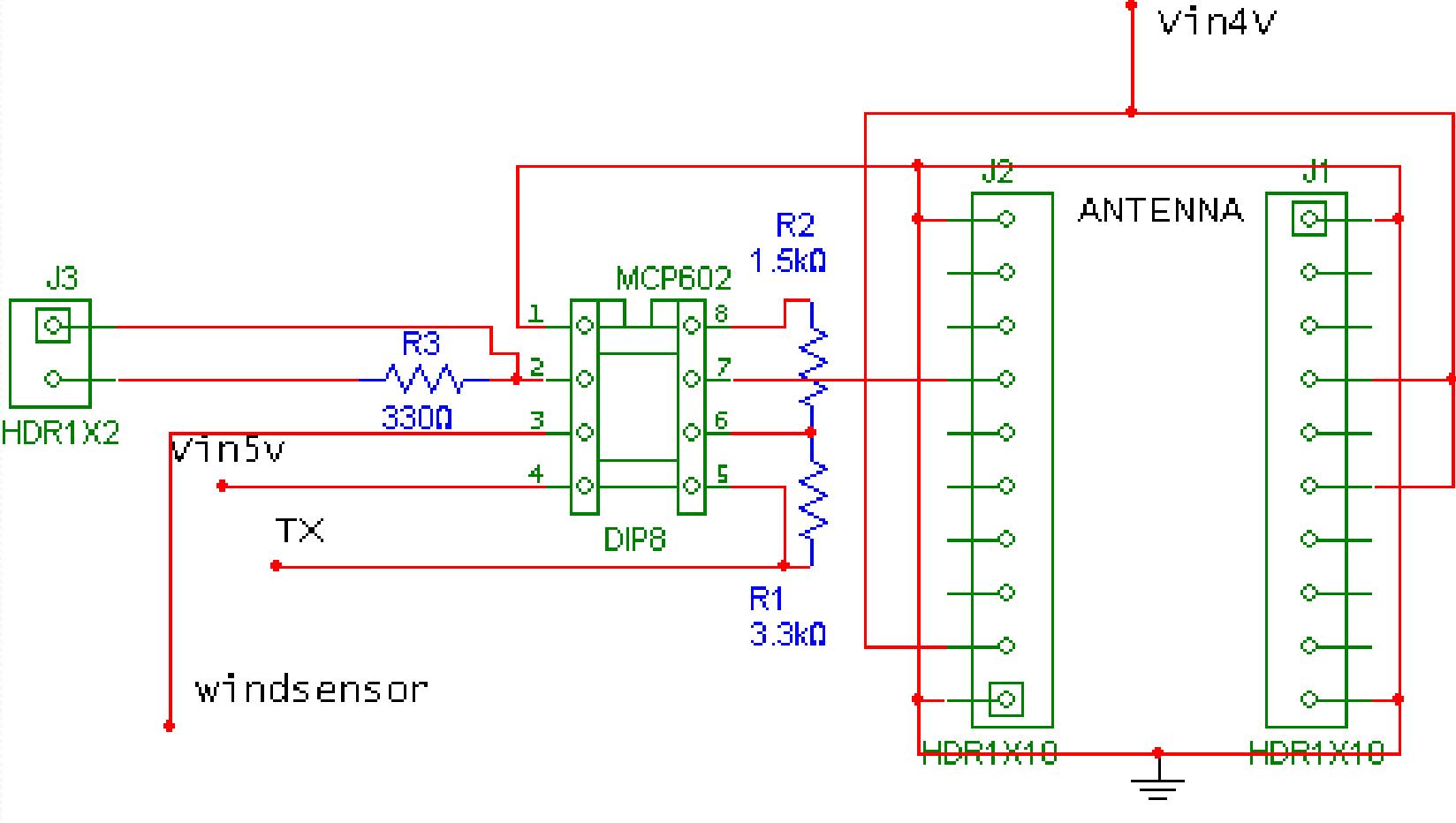
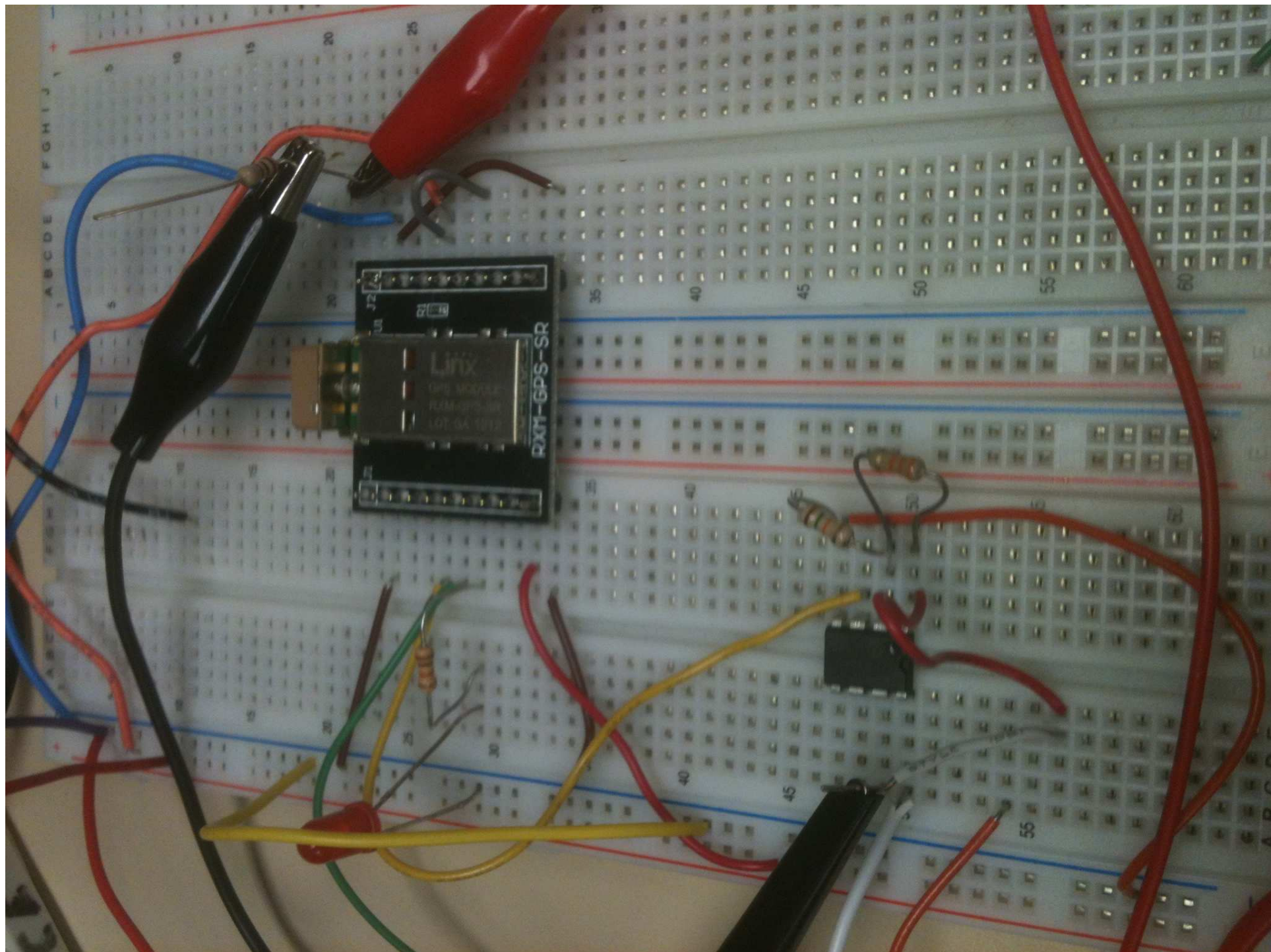


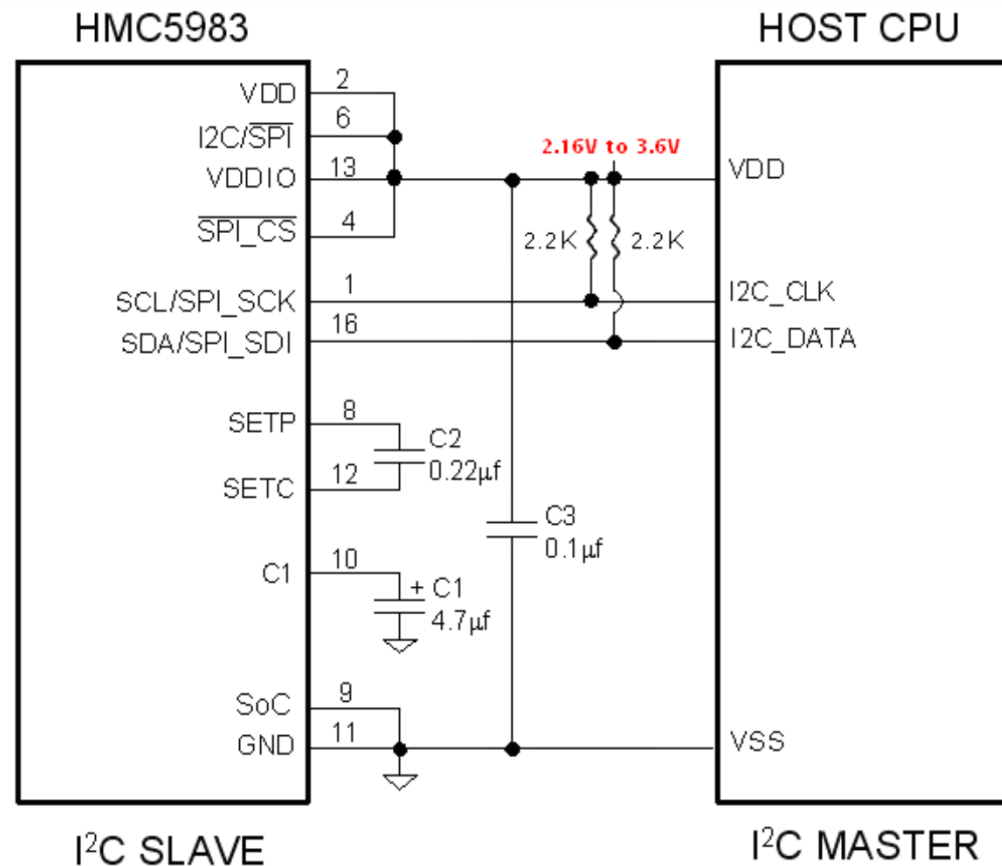
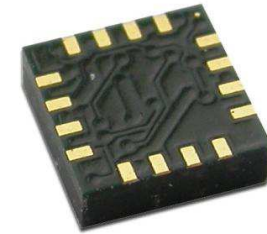
Figure 3: SR Series Module Typical Application



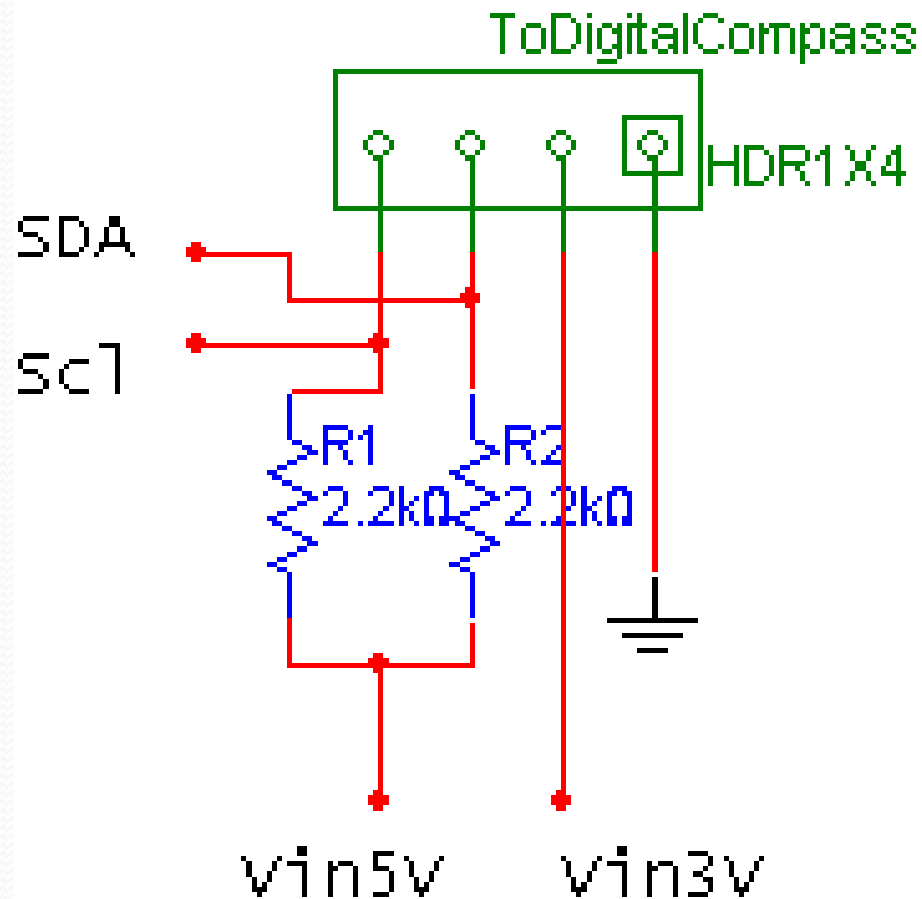


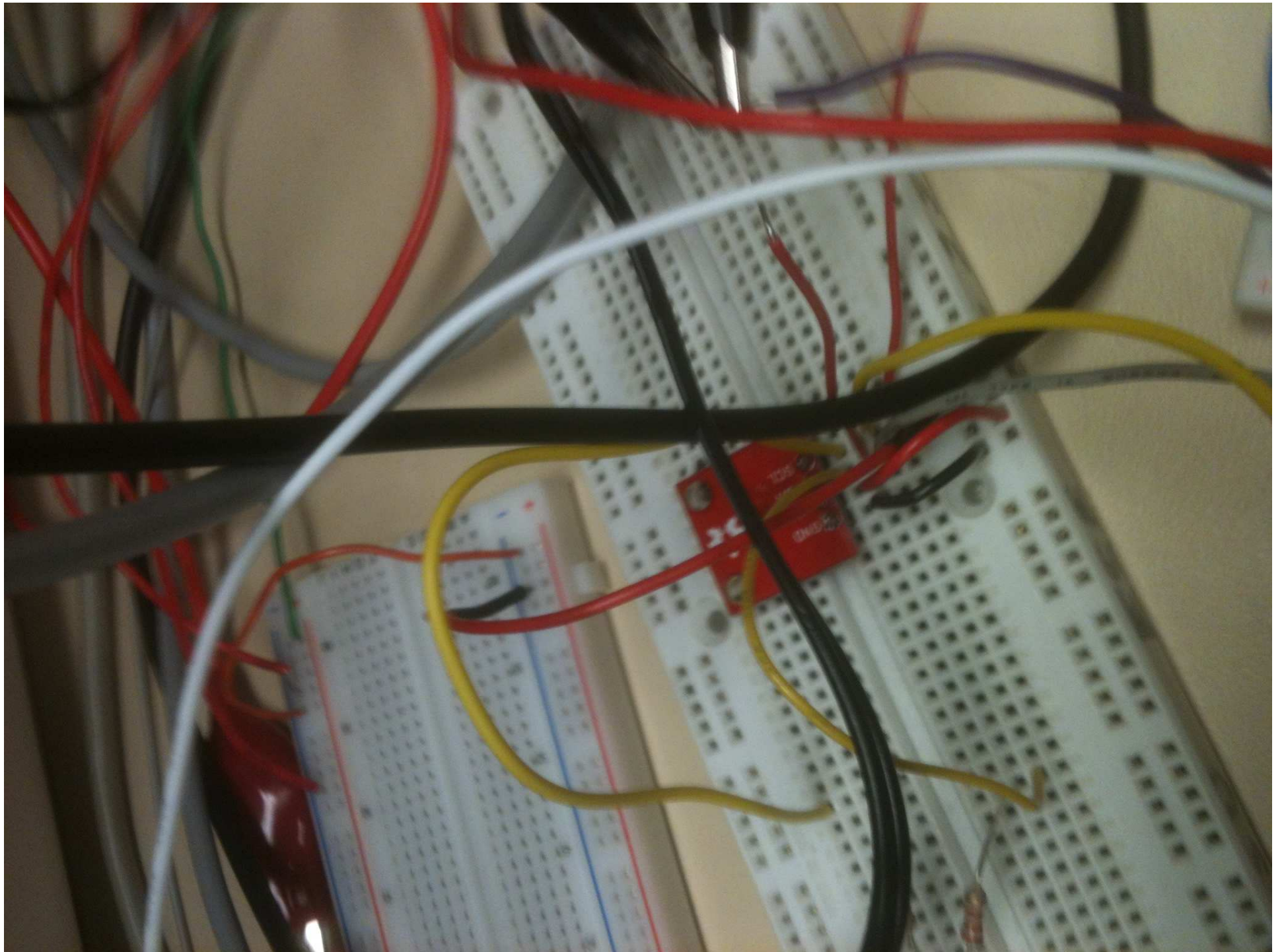
Digital Compass

- Automatically maintains sensor's sensitivity under wide operating temperature range
- High-speed interfaces for fast data communications. I²C up to 3.4 MHz
- Small size for Highly Integrated Products



Digital Compass Schematic



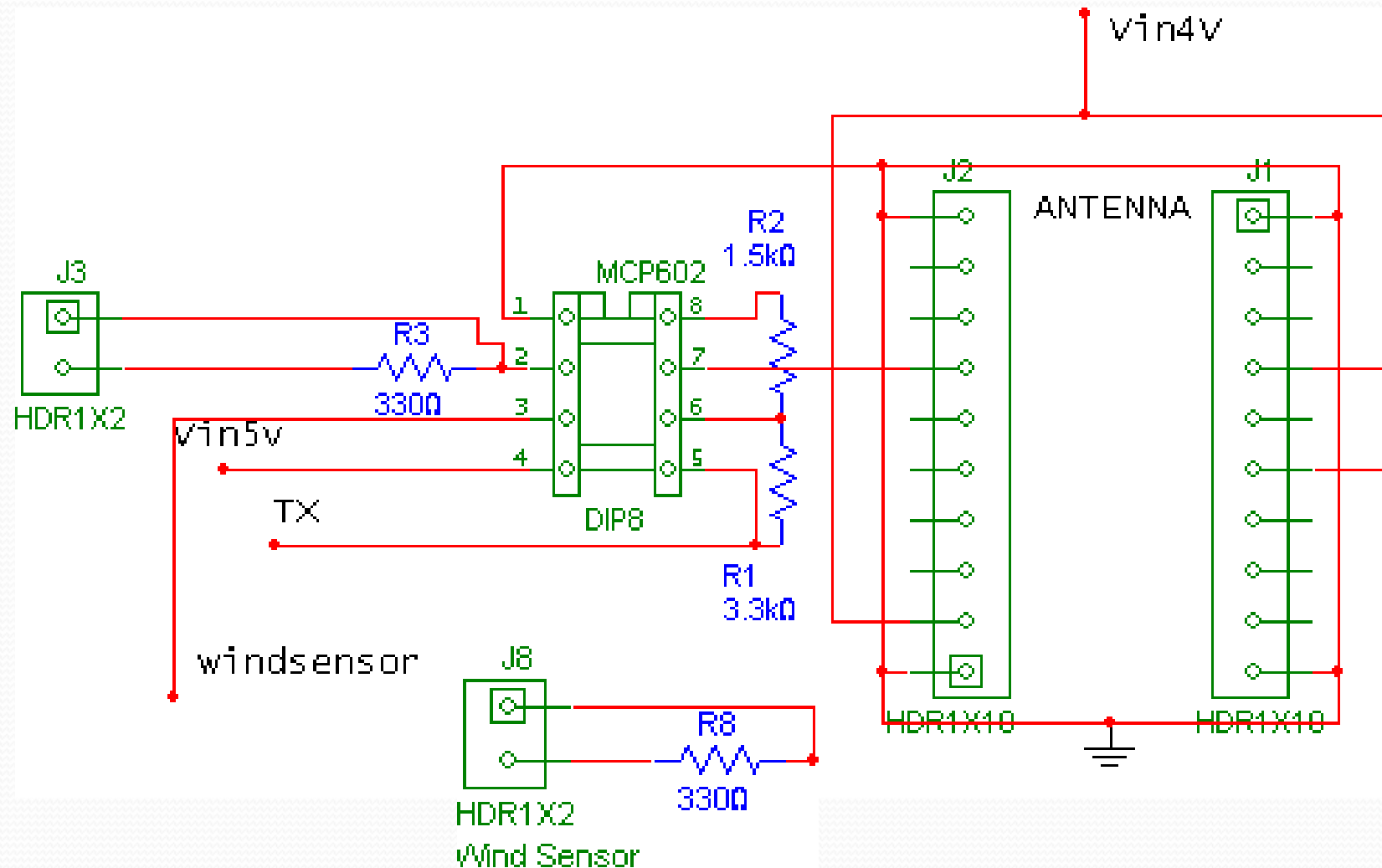




Wind Sensor

- John wanted this added in the second semester
- He had a bunch of these laying around and gave us it
- 3-cup anemometer
- 1 m/s to 96 m/s (2.2 mph to 215 mph) (highest recorded)
- Consensus Transfer Function
- 0 Hz to 125 Hz (highest recorded)
- -55 °C to 60 °C

Wind Sensor Schematic





PIC Microprocessor

- Microchip PIC18F4620

Advantages:

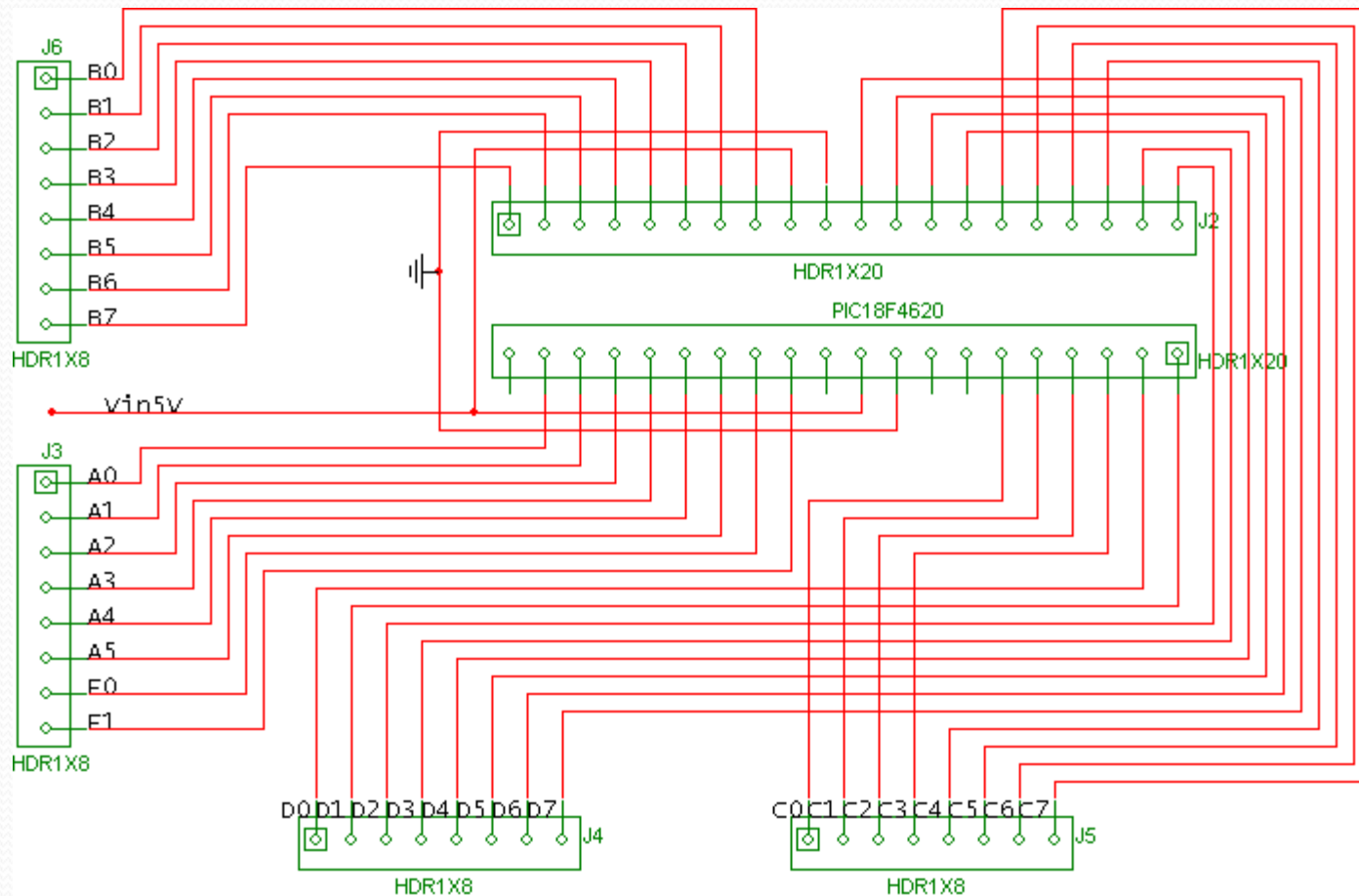
- Used before in class Familiar with microcontroller
- Comes with a compiler
- Has enough ports to handle our devices
- Has a boot loader
- Cost effective
- Optimized C language Compiling
- -40C to 125C

Disadvantages

- In comparison to other chips it is fairly large in size with low memory space

PIC Schematic

- Only shows picture of port connections





Motors

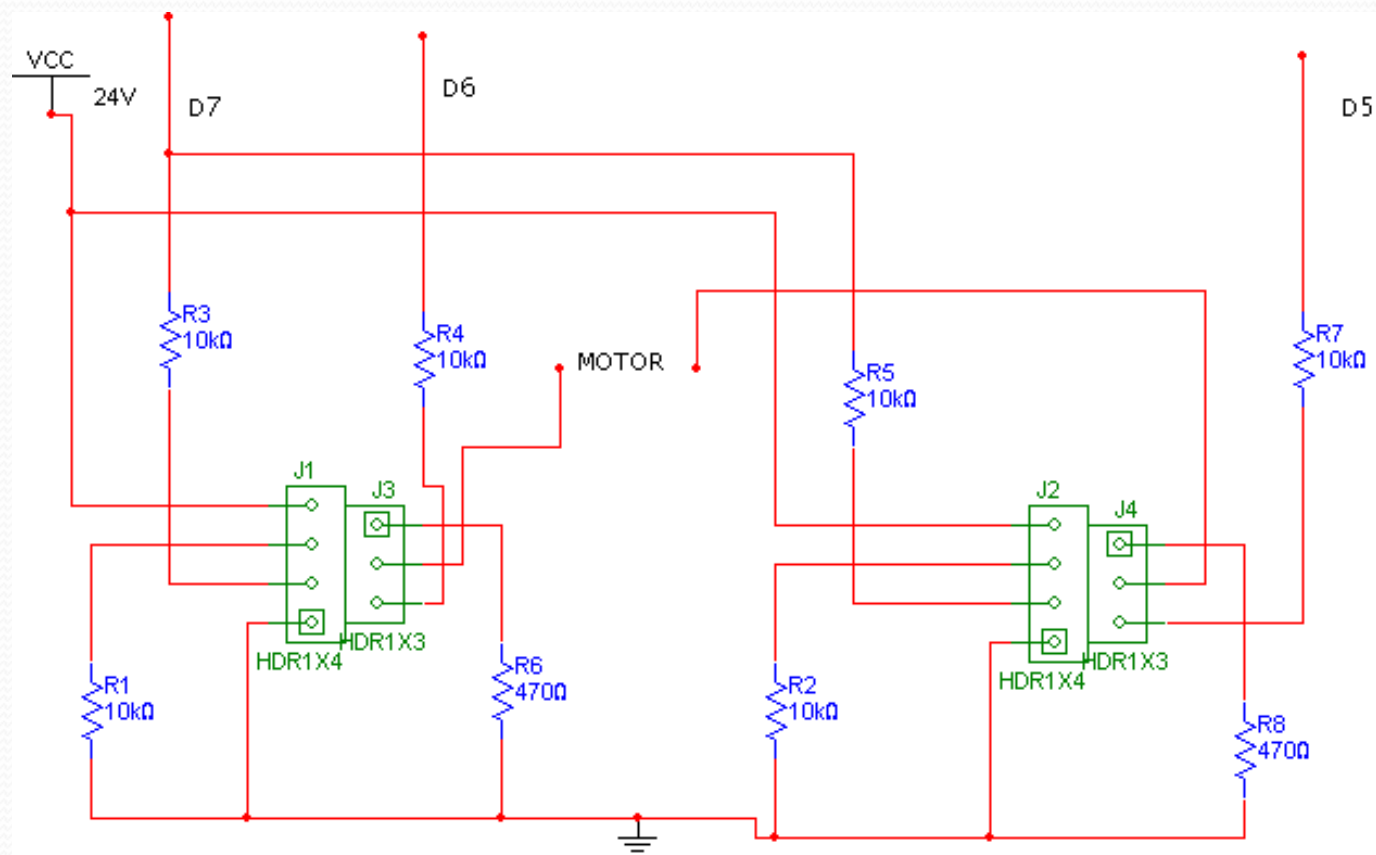
- Motors used in his panels
- 14954659 - VW76 24-36 VDC Actuator
- 24-36V DC Actuator
- 1/15HP
- Gear Ratio 19:1
- Current 3 Amps @ Full Load



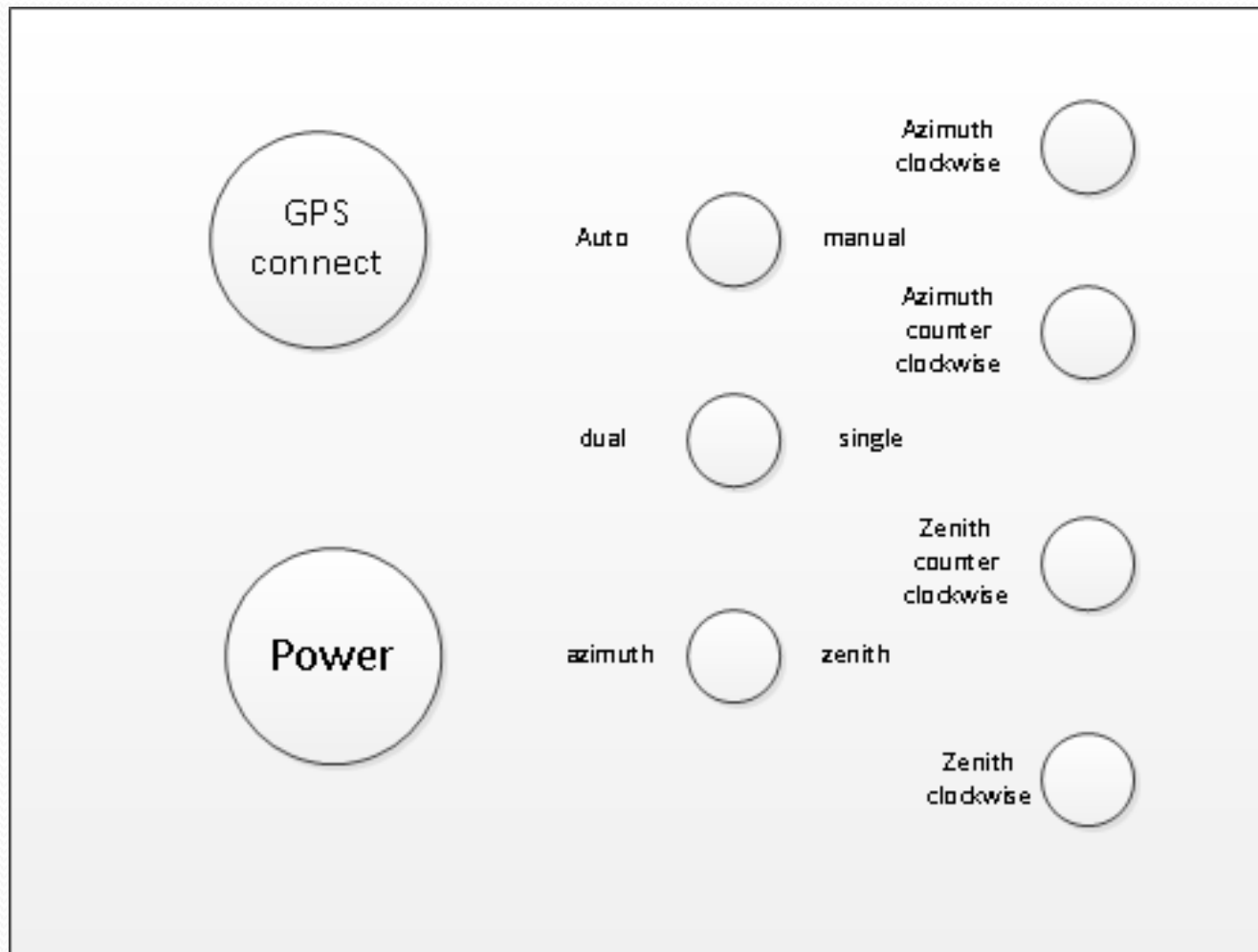
Half H-bridges

- John wanted to be able to use motors with 10A when we met with him second semester
- Had to change from 2 full 3A H-bridges to 4 10A half H bridges to meet requirement
- Used BTN7960, High Current PN Half Bridge
- -40 °C to +150 °C

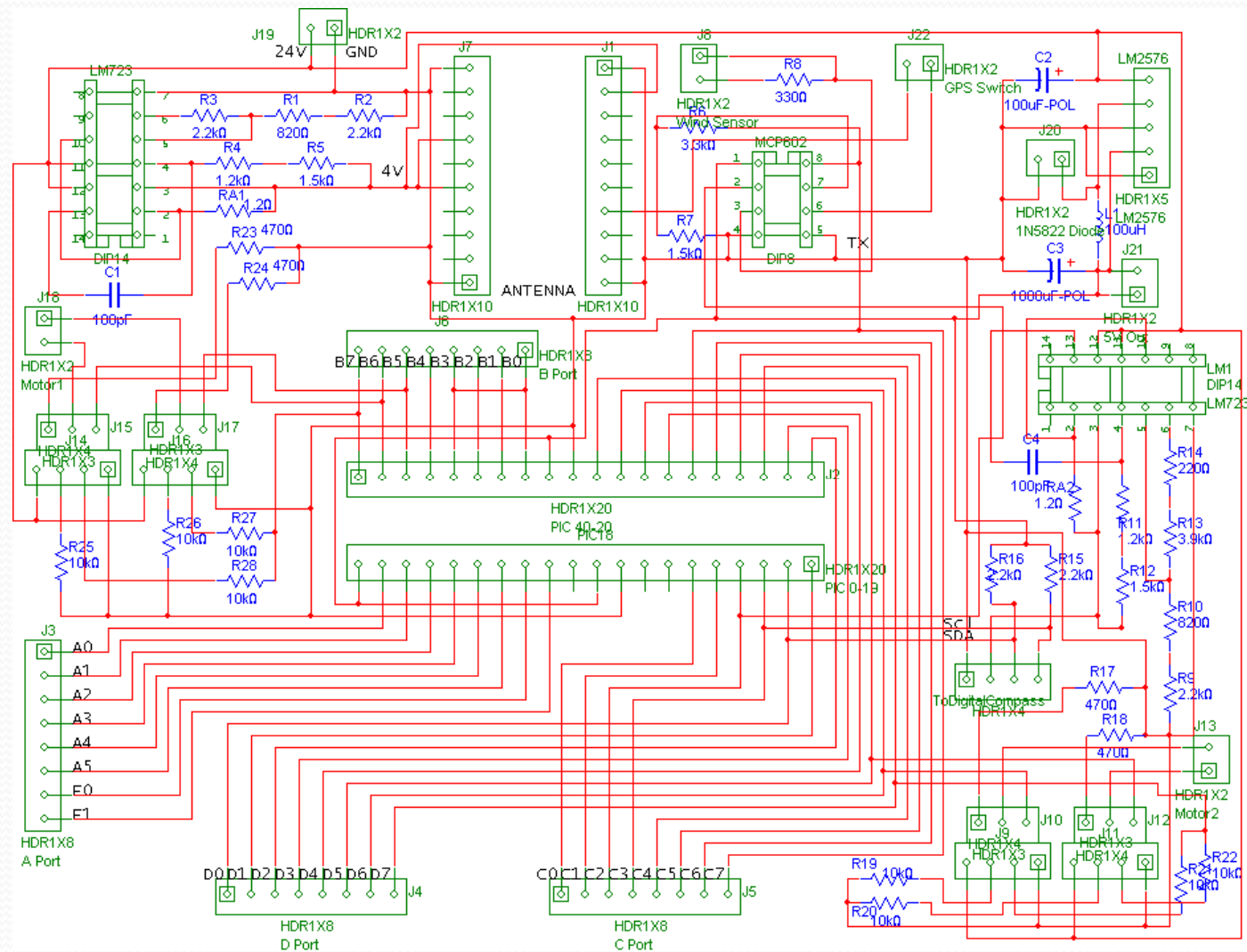
H-Bridge Schematic



Control Switches



Schematic



Flow Chart

